

Title: Fractional Pizza with Pizzazz

Brief Overview:

This learning unit involves dividing the “whole” into equivalent fractional parts, using as many different fractional combinations as possible. The students will be involved in several activities such as building pizzas, making fractional strips, and “trading” pizza pieces. The students also will apply previously acquired skills such as computation, data gathering, and multiplication. Come whet your appetite and explore the exciting world of fractions through pizzas. CIAO!

Links to NCTM Standards:

- **Mathematics as Problem Solving**
Students will demonstrate their ability to solve problems in mathematics including problems with open-ended answers, problems which are solved in a cooperative atmosphere, and problems which are solved with the use of technology.
- **Mathematics as Communication**
Students will demonstrate their ability to communicate mathematically. They will read, write, and discuss mathematics with language and the signs, symbols, and terms of the discipline.
- **Mathematics as Reasoning**
Students will demonstrate their ability to connect mathematics topics within the discipline and with other disciplines.
- **Mathematical Connections**
Students will demonstrate their ability to connect mathematics topics within the discipline with other disciplines.
- **Number Concepts and Relationships**
Students will demonstrate their ability to apply estimation strategies in computation, with the use of technology, in measurement, and in problem solving. They will determine reasonableness of solutions. Students will demonstrate their ability to solve problems using arithmetic operations with technology where appropriate. Students will use applications which may include fractions and decimals in the same problem.
- **Fractions and Decimals**
Students will demonstrate and apply concepts of fractions, mixed numbers, and decimals; use models to relate fractions to decimals and to find equivalent fractions; compute with whole numbers, fractions, and decimals; and apply fractions and decimals to problem solving situations.

Grade/Level:

Grades 3-4

Duration/Length:

Each activity should take approximately 45-60 minutes.

Prerequisite Knowledge:

Students should:

- be able to do these exercises using basic math skills.
- recognize fractions as part of a whole.
- know what the numerator and denominator in a fraction represent.
- be able to visually recognize simple fractions such as $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{10}$ and $\frac{1}{12}$.

Objectives:

Students will:

- work cooperatively with partners.
- manipulate objects to determine equivalent fractions.
- generate equivalent fractions using actual or picture objects.
- manipulate objects to show parts of a whole.
- record equivalent fractions from actual objects or pictures.
- name and recognize equivalent fractions.

Materials/Resources:

- Student calculators
- Fraction circle pieces
- Crayons, colored pencils
- Glue
- Fraction dice

Development/Procedures:

Present the following situation to the class:

- The Italian Club recently voted to work together with Little Caesar's Pizza to earn some money. Little Caesar's agreed to pay the club for each pizza order they took correctly. There would be no compensation for any incorrect orders. Therefore, the students have decided to practice taking orders before actually working in the pizza shop.

These were the pizza order rules enforced by Little Caesar's:

- 1) Customers have a choice of nine different toppings.
- 2) Each fractional piece can consist of only one topping (that is, $\frac{1}{2}$ of the pizza must be cheese, $\frac{1}{3}$ must be pepperoni, $\frac{1}{4}$ must be sausage, $\frac{1}{5}$ must be mushrooms, $\frac{1}{6}$ must be onions, $\frac{1}{8}$ must be olives, $\frac{1}{10}$ must be anchovies and $\frac{1}{12}$ must be ham. Refer to Teaching Resource #1)
- 3) Be sure that all of the pizza slices add up to a whole pizza.
- 4) Little Caesar's Pizza customers are very particular and insist on the best.

Each day you will be doing a different activity to help you prepare for working at Little Caesar's. Have a fun time and remember, you will be well-rewarded for your efforts and hard work at the end of the week.

Activity 1: Half a Pizza by Any Other Name

- Distribute Student Resource #1 and fraction circle pieces. Go over directions with students explaining that they are to place the " $\frac{1}{2}$ " piece on the left side of the circle and use any of their other pieces to complete the right side of the circle. Emphasize that they must make sure that all of the pieces are the same size and color. They are to then write these fraction names of pizza pieces equal to $\frac{1}{2}$ on the lines provided. The fraction names should be placed beginning with the lowest denominator. Collect finished sheets and fraction pieces.
- Distribute two copies of Student Resource #2 to each student. Tell students that they are going to try to figure out which fraction pieces they can use to make the $\frac{1}{2}$ piece. Remind them to use fraction pieces that are the same size (and color), rather than mixing them. Ask students to sketch rather than trace their fraction sets. This will help them visualize what the pieces look like. Emphasize that you are not looking for perfection in their sketches.
- Each student must work on their own fraction pizza strip but may use another student as a resource.
- Distribute a student calculator to each student. Ask them to "check" their work by adding all of the fractional pieces on each pizza to see if it adds up to $\frac{1}{2}$.
- When students finish their strips, ask them to write about the patterns they found and what they learned about fractions in doing this activity.
- Have students share their findings. Write down suggested equivalent fractions. When the list on the chalkboard is complete and in order, highlight to the class that although these fractions all look different, they are all names for $\frac{1}{2}$.
- Ask students if they think there are other names for $\frac{1}{2}$ even though they may not have the fraction pieces available.

Activity 2: Build a Pizza

- Distribute fraction circle pieces, a fractional die, a sheet of paper, and crayons or colored pencils to each pair of students.
- Highlight important information necessary to play the game and complete the task.
- Each person rolls the die and the player who rolls the larger fraction goes first.
- The first player rolls the die and places the fraction pieces which correspond to the number rolled on to the “whole” fraction piece.
- Continue to take turns until the “pizza” circle is completely covered with fraction pieces.
- A player may either add pieces to the circle or replace a piece(s) on his turn.
- Skip a player’s turn if he rolls a fraction that cannot fit the circle.
- When the pizza circle is complete, each player must sketch the final circle and write a number sentence which represents the completed circle.
- Instruct students to write several sentences explaining what they have learned from this activity.
- Distribute Student Resource #3 to each student. Remind students that when taking pizza orders these will be what some of the orders will be like. They will have to determine whether or not each order equals a whole pizza. If not, the customer will have to change his/her order.

Activity 3: Pizza Trade-Off

- Prior to this activity have each group of three student decorate a cardboard pizza that is 12 inches in diameter. Tell them that they can choose which one-topping pizza they would like it to be. Teacher will cut a pizza into half, another into fourths, thirds, sixths, and eighths. Place each group’s pizza into a pizza box (donated by Little Caesar’s, of course!)
- Announce to students that Little Caesar’s Pizza will reward the winning group of this activity with a pizza lunch. If all of the groups do well, the whole class will have a pizza party.
- Each group will exchange pizza slices with another group since each group has different pizza toppings. In trading pizza slices, the groups must make sure that every trade is a fair trade. Remember, the more exchanges made the greater the variety. Each group must have a recorder who will keep track of the number of trades made. Traded pizza slices can be traded again. The object of the activity is to make as many fair trades as possible.
- At the end of the timed period (30 minutes), students will return to their groups and put the pizza slices together. There will be some students who have one complete pizza.
- Have students share their findings. What problems did they encounter? Which fractional pieces caused the most trouble? Why did some students not have a complete pizza?

Performance Assessment:

Throughout this learning unit there should be continuous assessment of the student activities. Assessment is intertwined into the activities and combines class instruction with daily and culminating activities. The educator should continually observe and assess students working in groups and individual areas and journals. All written work should be collected to hold each student accountable for each activity.

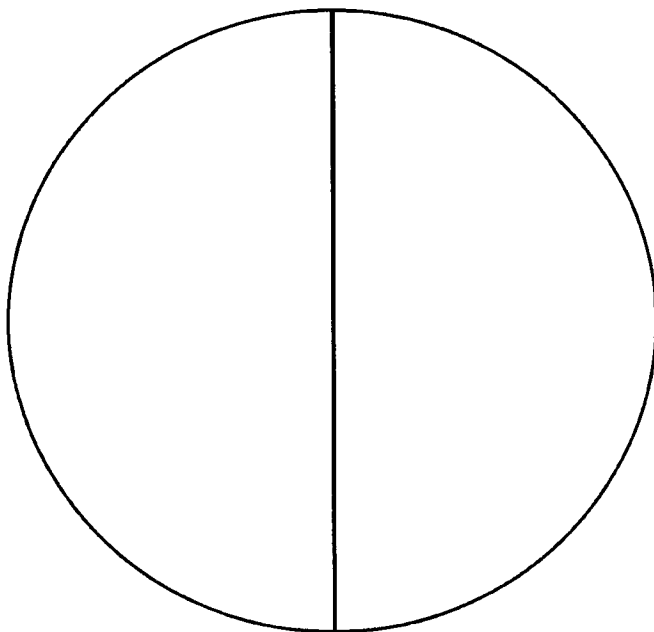
Extension/Follow Up:

- Play “Pizza Party” board game (Note: A Milton Bradley Board Game).
- Write a thank you letter to Little Caesar’s Pizza.
- Use Student Resource #4 for equivalent decimals.

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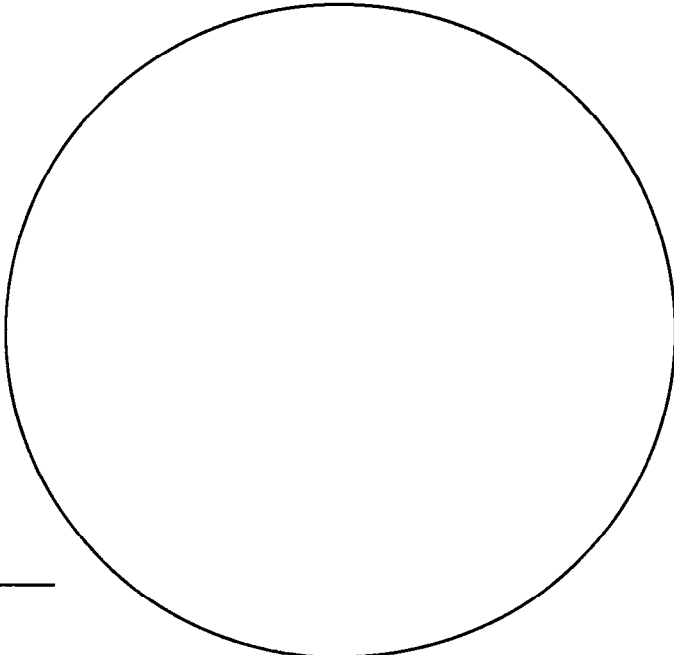
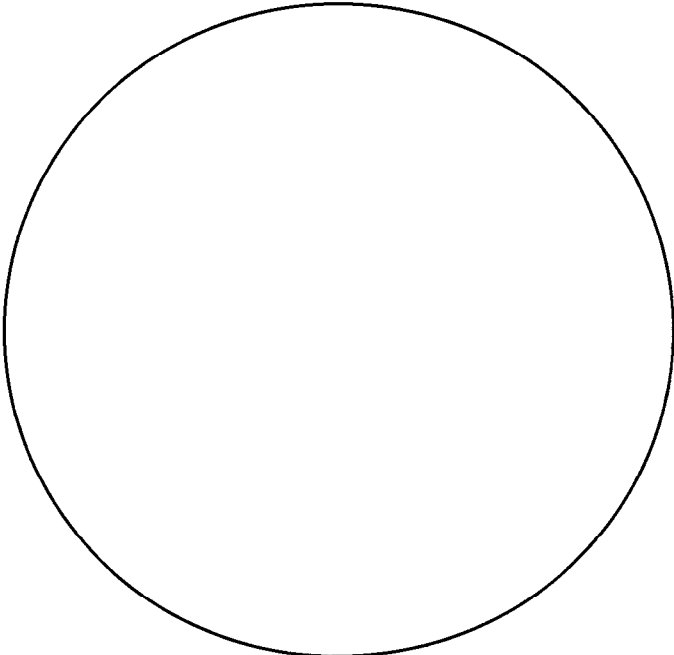
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$$\frac{1}{2}$$

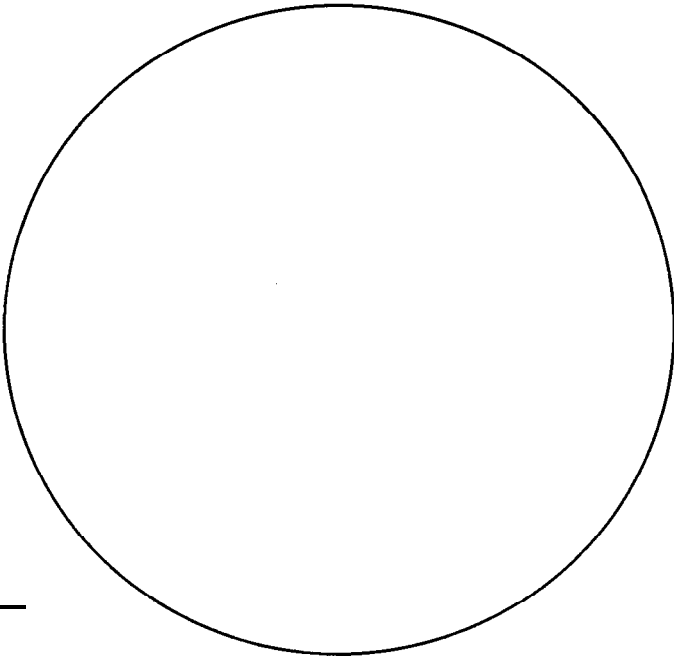
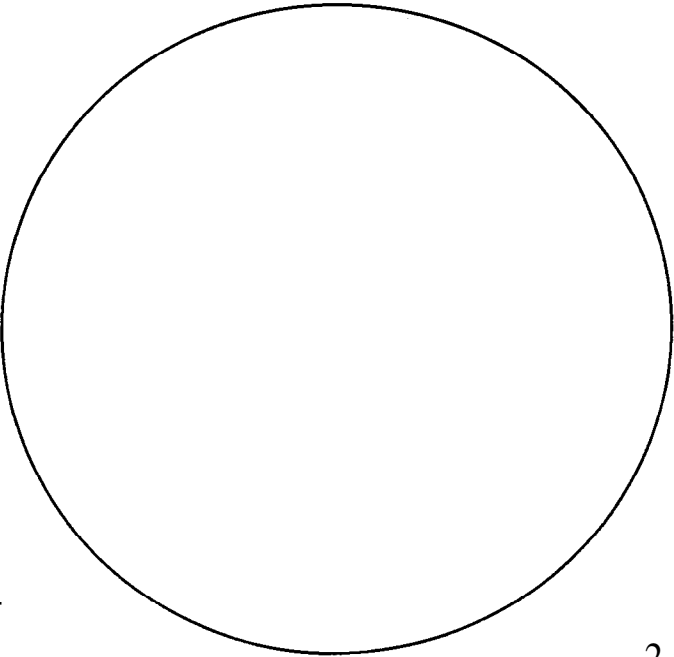
← **Other fraction names**

Directions: Place $\frac{1}{2}$ piece on the left side of the circle. On the right side of the empty half, build the other half of the pizza. Use fraction pieces that are the same size and color. Write other fraction names of the pizza pieces equal to $\frac{1}{2}$ on the lines provided in order by denominator.



cut along this line

fraction strips



2 per student

paste here

paste here

Let's Build A Pizza!

Student Resource 3

You are now going to have an opportunity to show your pizza-building expertise. You have been assigned the challenge of creating pizzas for the persnickety customers at Little Caesars. They are very fussy about the toppings they choose. Each topping is ordered in a fraction and cannot overlap other toppings. The toppings ordered must create a whole pizza. It is your challenge to determine if a customer order can be made. If a pizza is a little short of a whole, you may suggest a topping to the customer to complete it. Use your fraction circles and toppings key to help you. Good luck!

1. The first customer has ordered a pizza with the following toppings: cheese, onions, mushrooms and olives. Can they make a whole pizza? Show your work.

Work space

2. The second customer orders a pizza with these toppings: pepperoni, mushrooms, onion, olives, anchovies and ham. Can they make a whole pizza? Show your work.

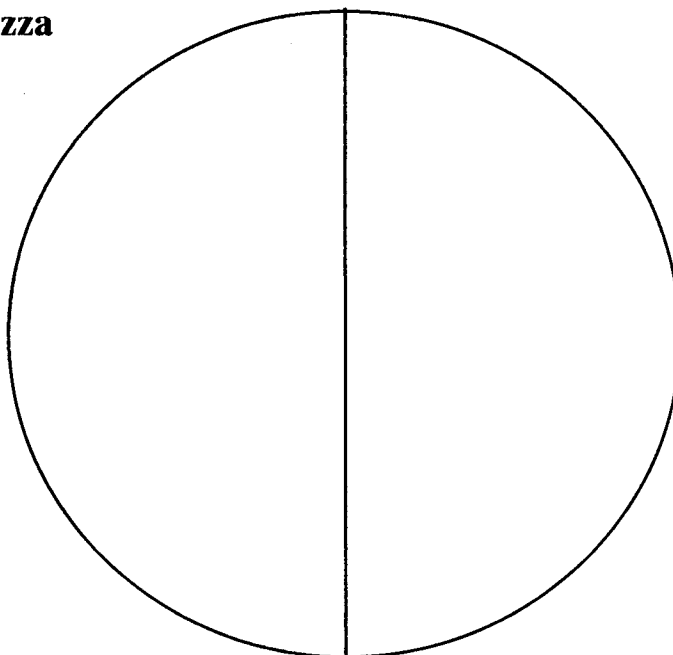
Work space

3. The third customer orders a pizza with following toppings: pepperoni, sausage, mushrooms and ham. Do they have enough toppings to order a whole pizza?

Work space

4. The fourth customer wants a pizza with the following toppings: cheese, sausage, mushrooms and onion. Do they have enough toppings to make a whole pizza?

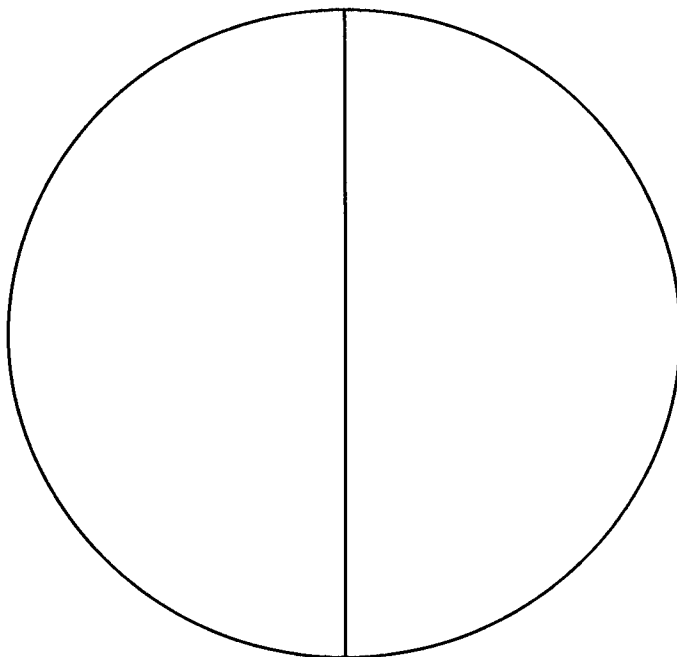
Work space



Fraction	Decimal Equivalent
$\frac{1}{2}$	•
$\frac{2}{4}$	•
$\frac{3}{6}$	•
$\frac{4}{8}$	•
$\frac{5}{10}$	•
$\frac{6}{12}$	•

Directions: Use your explorer calculator to convert each fraction into a decimal. What do you notice?

Why do you think you got this answer? What does this tell you about fractions?



$$\frac{1}{2}$$

$$\frac{2}{4}$$

$$\frac{3}{6}$$

$$\frac{4}{8}$$

$$\frac{5}{10}$$

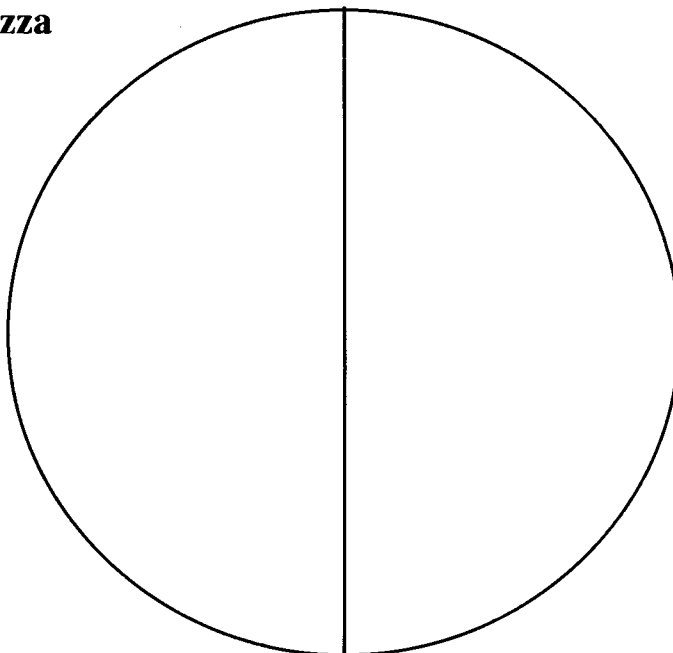
$$\frac{6}{12}$$

← **Other fraction
names**

Teaching Resource 2

Pizza Topping Key

Fraction	Topping	Fraction Circle Color
$\frac{1}{2}$	Cheese	Orange
$\frac{1}{3}$	Pepperoni	Green
$\frac{1}{4}$	Sausage	Purple
$\frac{1}{5}$	Mushrooms	Blue
$\frac{1}{6}$	Onions	Red
$\frac{1}{8}$	Olives	Brown
$\frac{1}{10}$	Anchovies	Yellow
$\frac{1}{12}$	Ham	Cream



Fraction	Decimal Equivalent
$\frac{1}{2}$.5
$\frac{2}{4}$.5
$\frac{3}{6}$.5
$\frac{4}{8}$.5
$\frac{5}{10}$.5
$\frac{6}{12}$.5

Directions: Use your explorer calculator to convert each fraction into a decimal. What do you notice?

The decimal each fraction is changed to is .5

Why do you think you got this answer? What does this tell you about fractions?

Because each fraction equivalent to $\frac{1}{2}$ is just another name for the same value.

There are many fractional names for each decimal value.

Performance Assessment

_____ 1) Group has made enough “trades to have a whole pizza.

_____ 2) The group has made at least three trades.

_____ 3) Written explanation of how to make the best trades.

All three	V+
2	V
1	V-